

WHAT IS CLAIMED IS:

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1. A method of providing a multi-wavelength light source, comprising the steps of modulating an optical pulse source so as to output optical pulses with a designated
- 10 repetition frequency;
- time-division multiplexing the optical pulses output by said optical pulse source so as to output optical pulses with a repetition frequency which is an integral multiple of said
- 15 designated repetition frequency; and
- demultiplexing wavelengths of the optical pulses with the repetition frequency which is the integral multiple of said designated repetition frequency so as to output
- 20 said wavelengths as the multi-wavelength light source.
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2. An apparatus for providing a multi-wavelength light source, comprising:
- an optical pulse source which is modulated so as to output optical pulses with a
- 30 designated repetition frequency;
- a time-division multiplexing unit which time-division multiplexes the optical pulses output by said optical pulse source so as to output optical pulses with a repetition
- 35 frequency which is an integral multiple of said designated repetition frequency; and
- a wavelength demultiplexing unit which

demultiplexes wavelengths of the optical pulses
with the repetition frequency which is the
integral multiple of said designated repetition
frequency so as to output said wavelengths as
5 the multi-wavelength light source.

10 3. The apparatus for providing a
multi-wavelength light source as claimed in claim 2,
wherein said time-division multiplexing
unit is a Mach-Zehnder-interferometer-type time-
division multiplexing apparatus.

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4. The apparatus for providing a
20 multi-wavelength light source as claimed in claim 2,
wherein said time-division multiplexing
unit is a Michelson-interferometer-type time-
division multiplexing apparatus.

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5. The apparatus for providing a
multi-wavelength light source as claimed in claim 2,
30 wherein said time-division multiplexing
unit time-division multiplexes said optical
pulses using a plurality of optical waveguides
with different optical path lengths which are
arranged in a planar lightwave circuit.

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6. The apparatus for providing a multi-wavelength light source as claimed in claim 2, wherein said wavelength demultiplexing
5 unit is a wavelength demultiplexer having a multi-peak structure with a center transmission frequency spacing which is the integral multiple of said designated repetition frequency.

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7. The apparatus for providing a multi-wavelength light source as claimed in claim 6,
15 wherein said wavelength demultiplexer is an arrayed waveguide grating filter.

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8. The apparatus for providing a multi-wavelength light source as claimed in claim 7, wherein said planar lightwave circuit and said arrayed waveguide grating filter are
25 provided on one board.

30 9. The apparatus for providing a multi-wavelength light source as claimed in claim 2, further comprising a spectrum-broadening unit which broadens spectrum of the optical pulses which are received at said time-division
35 multiplexing unit, said spreading effected by a non-linear medium having a third-order non-linear effect.